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Authors: J.G. Gould D.S. Smith J.K. Kolker
 VeriSign, Inc. VeriSign, Inc. GoDaddy Inc.
 R.C. Carney
 GoDaddy Inc.

Redacted Fields in the Registration Data Access Protocol (RDAP) Response

Abstract

This document describes an RDAP extension for specifying methods of redaction of RDAP responses and explicitly identifying redacted RDAP response fields, using JSONPath as the default expression language.

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1. Introduction

This document describes an RDAP extension for specifying methods of redaction of RDAP responses and explicitly identifying redacted RDAP response fields, using JSONPath as the default expression language. A redacted RDAP field is one that has data removed or replaced in the RDAP response due to server policy, such as the lack of client privilege to receive the field. This extension can be used to identify redacted RDAP fields in any RDAP object class, as defined in [\[RFC9083\]](#), or RDAP fields defined in RDAP extensions. Because an RDAP response may exclude a field due to either the lack of data or based on the lack of RDAP client privileges, this extension is used to explicitly specify which RDAP fields are not included in the RDAP response due to redaction. It thereby provides a capability for disambiguation between redaction and possible other reasons for data or field absence.

In [\[RFC9082\]](#) RDAP supports both lookup and search queries, where a lookup query responds with a single object and a search query responds with a list of objects. This document applies to redaction of a single object of a lookup response and in each of the objects of a search response.

JSONPath, as defined in [\[I-D.ietf-jsonpath-base\]](#), is used as the default expression language to reference RDAP fields that have been redacted. The redacted JSON fields will either be removed, have empty values, have partial values, or be replaced in the RDAP response. JSON is defined by [\[RFC8259\]](#).

2. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [\[RFC2119\]](#) [\[RFC8174\]](#) when, and only when, they appear in all capitals, as shown here.

The JSON examples include extra line breaks and whitespace. For instance, the JSONPath expressions are broken out into multiple lines when required for illustration.

The JSONPath expressions in the examples are for illustration purposes with single-role entities and the exact expressions to use by the server is out-of-scope.

3. Redaction Methods

Redaction in RDAP can be handled in multiple ways. Redaction in RDAP can be handled in multiple ways. The resulting redacted RDAP response MUST comply with the format defined in the RDAP RFCs with

the RDAP RFCs, such as [\[RFC9083\]](#) and updates. The use of placeholder text for the values of the RDAP fields, such as the placeholder text "XXXX", MUST NOT be used for redaction, since the placeholder text value may not match the format requirements of each of the RDAP fields and provides an inconsistent and unreliable redaction signal. This section covers the redaction methods that can be used with the redaction signaling defined in [Section 4.2](#).

RDAP responses, as defined in [\[RFC9083\]](#), include a mix of JSON objects and JSON arrays, where JSON arrays are heavily used for entity objects with [jCard](#) [\[RFC7095\]](#). [jCard](#) [\[RFC7095\]](#) is a JSON representation of [vCard](#) [\[RFC6350\]](#) that inherits its dependency on arrays. An example is the [vCard](#) [\[RFC6350\]](#) "ADR" property / [jCard](#) [\[RFC7095\]](#) "adr" property that defines a sequence of address components. According to [\[RFC6350\]](#), when an "ADR" property component value is missing, the associated component separator MUST still be specified. [jCard](#) [\[RFC7095\]](#) extends the use of arrays with each individual vCard property being represented by an array of three fixed elements, followed by one or more additional elements. The mix of JSON objects and JSON arrays impacts the methods used for redaction in RDAP.

The redaction of RDAP fields fall into the four categories defined in the following sub-sections.

3.1. Redaction by Removal Method

The Redaction by Removal Method is when the RDAP field is removed from the RDAP response, which is the default method. The Redaction by Removal Method can be done for all RDAP response fields other than response fields using the position in an array to signal the redacted field (e.g., the JSON arrays used with [jCard](#) [\[RFC7095\]](#)). RDAP extensions such as [JSContact in Registration Data Access Protocol \(RDAP\) JSON Responses](#) [\[I-D.ietf-regext-rdap-jscontact\]](#) do not have a dependency on the use of positional JSON arrays and are therefore suited for the Redaction by Removal Method.

When an RDAP object is redacted by removal, all of the RDAP object's child fields are also removed. Only the redacted RDAP object needs to be referenced in the list of redacted fields, as defined in [Section 4.2](#).

An example of redacting an RDAP object is removing the administrative contact from the RDAP response and including the following "redacted" member:

```

"redacted": [
  {
    "name": {
      "description": "Administrative Contact"
    },
    "prePath": "$.entities[?(@.roles[0]=='administrative')]",
    "method": "removal"
  }
]

```

Figure 1: Redacted Administrative Contact

The Redaction by Removal Method MUST NOT be used to remove an element of an array where the position of the element in the array determines semantic meaning. For example, removal of an individual data field in [jCard](#) [RFC7095] will result in a non-conformant [jCard](#) [RFC7095] array definition.

3.2. Redaction by Empty Value Method

The Redaction by Empty Value Method is when a redacted field is not removed, but its value is set to an empty value, such as "" for a [jCard](#) [RFC7095] Text ("text") property or null for a non-Text property. The empty [jCard](#) [RFC7095] values (" or null) are referenced in the "redacted" member in place of the [jCard](#) [RFC7095] property name in a array, such as referencing the "fn" [jCard](#) [RFC7095] property value at position 3 instead of referencing the "fn" jCard property name at position 0. The Redaction by Empty Value Method MUST be used only when redacting JSON response fields that use the position in an array to signal the redacted field (e.g., [jCard](#) [RFC7095] arrays). Optional [jCard](#) [RFC7095] properties MUST use the [Redaction by Removal Method](#) (Section 3.1) to redact the entire property. The required [jCard](#) [RFC7095] "fn" property, defined in section 6.2.1 of [vCard](#) [RFC6350], MUST use the Redaction by Empty Value Method to redact the property value. Removing the "fn" property would violate [vCard](#) [RFC6350] and removing the property value would violate the fixed array positions defined in [jCard](#) [RFC7095].

An example of the redacted "fn" jCard property using the Redaction by Empty Value Method:

```

[
  "fn",
  {},
  "text",
  ""
]

```

Figure 2: Redacted "fn" jCard property using Redaction by Empty Value Method

An example of the "redacted" member for the redacted "fn" jCard property value, which is array position 3:

```
"redacted": [
  {
    "name": {
      "description": "Registrant Name"
    },
    "postPath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='fn')][3]",
    "pathLang": "jsonpath",
    "method": "emptyValue",
    "reason": {
      "description": "Server policy"
    }
  }
]
```

Figure 3: Redacted Registrant Name using Array Position

3.3. Redaction by Partial Value Method

The Redaction by Partial Value Method is when a redacted field is not removed, but its value has a portion of the data removed, such as for the "label" or "fn" [jCard \[RFC7095\]](#) properties. The partial values are referenced in the "redacted" member in place of the property name in a array, such as referencing the "fn" [jCard \[RFC7095\]](#) property value at position 3 instead of referencing the "fn" jCard property name at position 0. The Redaction by Partial Value Method SHOULD be used only when redacting JSON response fields that use a formatted value, where a portion of the value is removed.

An example of the "label" jCard property in Figure 15 of [\[RFC7095\]](#) that redacts "123 Maple Ave\nSuite 901\n":

```
[ "adr",
  {
    "type": "home",
    "label": "Vancouver\nBC\n1239\n"
  },
  "text",
  [
    "", "", "", "", "", "", ""
  ]
]
```

Figure 4: Redacted "label" jCard property

An example of the "redacted" member for the redacted "label" jCard property value, based on Figure 15 of [\[RFC7095\]](#):

```
"redacted": [  
  {  
    "name": {  
      "description": "Home Address Label"  
    },  
    "postPath": "$.vcardArray[1][?(@[0]=='adr')][1].label",  
    "pathLang": "jsonpath",  
    "method": "partialValue",  
    "reason": {  
      "description": "Server policy"  
    }  
  }  
]
```

Figure 5: Redacted Label using the Redaction by Partial Value Method

3.4. Redaction by Replacement Value Method

The Redaction by Replacement Value Method is when a redacted field is not removed, but its value is replaced with a different value, such as protecting the "email" [jCard \[RFC7095\]](#) property value with an anonymized email "text" value or the use of an alternative "uri" value to a web form. Replacing a property value is a form of redaction, since it protects the true property value for privacy reasons.

An example of the redacted "email" jCard property using the Redaction by Replacement Value Method with an anonymized email:

```
[  
  "email",  
  {},  
  "text",  
  "anonymized123@example.com"  
]
```

Figure 6: Redacted "email" jCard property using Redaction by Replacement Value Method with an anonymized email

An example of the "redacted" member for the redacted registrant "email" jCard property value with an anonymized "text" value.

```

"redacted": [
  {
    "name": {
      "description": "Registrant Email"
    },
    "postPath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='email')][3]",
    "pathLang": "jsonpath",
    "method": "replacementValue",
  }
]

```

Figure 7: Redacted Email using Replacement Value with an anonymized "text" value

An example of the redacted "email" jCard property using the Redaction by Replacement Value Method with a [RFC8605](#) "contact-uri" jCard property to a web form:

```

[
  "contact-uri",
  {},
  "uri",
  "https://email.example.com/123"
]

```

Figure 8: Redacted "email" jCard property using Redaction by Replacement Value Method with a "contact-uri" jCard property to a web form

An example of the "redacted" member for the redacted registrant "email" jCard property with a [RFC8605](#) "contact-uri" jCard property to a web form:

```

"redacted": [
  {
    "name": {
      "description": "Registrant Email"
    },
    "prePath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='email')]",
    "replacementPath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='contact-uri')]",
    "pathLang": "jsonpath",
    "method": "replacementValue",
  }
]

```


Figure 9: Redacted Email using Replacement Value with a "contact-uri" jCard property to a web form

4. Redacted RDAP Response

4.1. RDAP Conformance

RDAP responses that contain values described in this document MUST indicate conformance with this specification by including an "rdapConformance" ([[RFC9083](#)]) value of "redacted". The "redacted" extension identifier is described in [Section 6.1](#).

Example "rdapConformance" member with the redacted extension:

```
"rdapConformance": [  
  "rdap_level_0",  
  "redacted"  
]
```

Figure 10: "rdapConformance" with Redacted Extension

4.2. "redacted" Member

The "redacted" member MUST be added to the RDAP response when there is one or more redacted fields. The "redacted" member is included as a member of the object instance in a lookup response, such as the object classes defined in [[RFC9083](#)], and as a member of the object instances in a search response.

The server including a redacted signal provides an unauthorized client additional information related to the existence of data and MAY exclude the redacted members for RDAP fields that are considered a privacy issue in providing a data existence signal. The server MAY choose to publish a redaction policy describing how this extension is implemented for their constituency. The contents of such a policy are outside the scope of this specification.

The "redacted" member contains an array of objects with the following child members:

"name": REQUIRED logical name for the redacted field. The logical name used for the redacted field is up to server policy. The logical name is defined using an object with a "type" field denoting a registered redacted name (see [Section 6.2](#)) or a "description" field denoting an unregistered redacted name. The

registered redacted names and the chosen unregistered names can meet the needs of different RDAP services or industries.

"prePath": OPTIONAL JSON path expression referencing a redacted JSON field in the pre-redacted response. The "prePath" member MAY be set when the redacted field does not exist in the redacted response for the [Redaction By Removal Method \(Section 3.1\)](#) and the [Redaction by Replacement Value Method \(Section 3.4\)](#). The "prePath" member MUST NOT be set when the "postPath" member is set.

"postPath": OPTIONAL JSON path expression referencing a redacted JSON field in the redacted (post-redacted) response. The "postPath" member MUST be set when the redacted field does exist in the redacted response for the [Redaction by Empty Value Method \(Section 3.2\)](#), the [Redaction by Partial Value Method \(Section 3.3\)](#), and the [Redaction by Replacement Value Method \(Section 3.4\)](#). The "postPath" member MUST NOT be set when the "prePath" member is set.

"replacementPath": OPTIONAL JSON path expression of the replacement field of the redacted field with the [Redaction by Replacement Value Method \(Section 3.4\)](#), using the expression language defined by the "pathLang" member.

"pathLang": OPTIONAL JSON path expression language used, with the default value of "jsonpath" for JSONPath ([[I-D.ietf-jsonpath-base](#)]). Other JSON path expression languages registered with the "redacted expression language" RDAP JSON Values Registry Type MAY be used based on server policy.

"method": OPTIONAL redaction method used; with one of the following values:

- *"removal" indicating the [Redaction By Removal Method \(Section 3.1\)](#),

- *"emptyValue" indicating the [Redaction by Empty Value Method \(Section 3.2\)](#), or

- *"partialValue" indicating the [Redaction by Partial Value Method \(Section 3.3\)](#), or

- *"replacementValue" indicating the [Redaction by Replacement Value Method. \(Section 3.4\)](#)

The default value is "removal" when not provided.

"reason": OPTIONAL human readable reason(s) for the redacted field in the language defined by the [[RFC9083](#)] "lang" member. The

default language is "en" if the [[RFC9083](#)] "lang" member is not specified. The reason is defined using an object with an OPTIONAL "type" field denoting a registered redacted reason (see see [Section 6.2](#)) and an OPTIONAL "description" field denoting an unregistered redacted reason. The "description" field MUST NOT be a client processing dependency.

Example unredacted version of an RDAP lookup response:

```
{
  "rdapConformance": [
    "rdap_level_0"
  ],
  "objectClassName": "domain",
  "handle": "ABC123",
  "ldhName": "example.com",
  "securedDNS": {
    "delegationSigned": false
  },
  "notices": [
    {
      "title": "Terms of Use",
      "description": [
        "Service subject to Terms of Use."
      ],
      "links": [
        {
          "rel": "self",
          "href": "https://www.example.com/terms-of-use",
          "type": "text/html",
          "value": "https://www.example.com/terms-of-use"
        }
      ]
    }
  ],
  "nameservers": [
    {
      "objectClassName": "nameserver",
      "ldhName": "ns1.example.com"
    },
    {
      "objectClassName": "nameserver",
      "ldhName": "ns2.example.com"
    }
  ],
  "entities": [
    {
      "objectClassName": "entity",
      "handle": "123",
      "roles": [
        "registrar"
      ],
      "publicIds": [
        {
          "type": "IANA Registrar ID",
          "identifier": "1"
        }
      ]
    }
  ],
}
```

```
"vcardArray": [  
  "vcard",  
  [  
    [  
      "version",  
      {},  
      "text",  
      "4.0"  
    ],  
    [  
      "fn",  
      {},  
      "text",  
      "Example Registrar Inc."  
    ],  
    [  
      "adr",  
      {},  
      "text",  
      [  
        "",  
        "Suite 100",  
        "123 Example Dr.",  
        "Dulles",  
        "VA",  
        "20166-6503",  
        "US"  
      ]  
    ],  
    [  
      "email",  
      {},  
      "text",  
      "contact@organization.example"  
    ],  
    [  
      "tel",  
      {  
        "type": "voice"  
      },  
      "uri",  
      "tel:+1.7035555555;ext=1234"  
    ],  
    [  
      "tel",  
      {  
        "type": "fax"  
      },  
      "uri",
```

```

        "tel:+1.7035555556"
    ]
]
],
"entities": [
    {
        "objectClassName": "entity",
        "roles": [
            "abuse"
        ],
        "vcardArray": [
            "vcard",
            [
                [
                    "version",
                    {},
                    "text",
                    "4.0"
                ],
                [
                    "fn",
                    {},
                    "text",
                    "Abuse Contact"
                ],
                [
                    "email",
                    {},
                    "text",
                    "abuse@organization.example"
                ],
                [
                    "tel",
                    {
                        "type": "voice"
                    },
                    "uri",
                    "tel:+1.7035555555;ext=1234"
                ]
            ]
        ]
    }
]
},
{
    "objectClassName": "entity",
    "handle": "XXXX",
    "roles": [
        "registrant"
    ]
}

```

```
],
"vcardArray": [
  "vcard",
  [
    [
      "version",
      {},
      "text",
      "4.0"
    ],
    [
      "fn",
      {},
      "text",
      "Registrant User"
    ],
    [
      "org",
      {},
      "text",
      "Example Inc."
    ],
    [
      "adr",
      {},
      "text",
      [
        "",
        "Suite 1235",
        "4321 Rue Somewhere",
        "Quebec",
        "QC",
        "G1V 2M2",
        "Canada"
      ]
    ],
    [
      "email",
      {},
      "text",
      "registrant.user@example.com"
    ],
    [
      "tel",
      {
        "type": "voice"
      },
      "uri",
      "tel:+1-555-555-1235;ext=123"
    ]
  ]
]
```

```

    ],
    [
      "tel",
      {
        "type": "fax"
      },
      "uri",
      "tel:+1-555-555-5321"
    ]
  ]
},
{
  "objectClassName": "entity",
  "handle": "YYYY",
  "roles": [
    "technical"
  ],
  "vcardArray": [
    "vcard",
    [
      [
        "version",
        {},
        "text",
        "4.0"
      ],
      [
        "fn",
        {},
        "text",
        "Technical User"
      ],
      [
        "org",
        {},
        "text",
        "Example Inc."
      ],
      [
        "adr",
        {},
        "text",
        [
          "",
          "Suite 1234",
          "4321 Rue Somewhere",
          "Quebec",
          "QC",

```



```

        "G1V 2M2",
        "Canada"
    ]
],
[
    "email",
    {},
    "text",
    "technical.user@example.com"
],
[
    "tel",
    {
        "type": "voice"
    },
    "uri",
    "tel:+1-555-555-1234;ext=321"
],
[
    "tel",
    {
        "type": "fax"
    },
    "uri",
    "tel:+1-555-555-4321"
]
]
},
{
    "objectClassName": "entity",
    "handle": "ZZZZ",
    "roles": [
        "administrative"
    ],
    "vcardArray": [
        "vcard",
        [
            [
                "version",
                {},
                "text",
                "4.0"
            ],
            [
                "fn",
                {},
                "text",
                "Administrative User"
            ]
        ]
    ]
}

```

```

    ],
    [
        "org",
        {},
        "text",
        "Example Inc."
    ],
    [
        "adr",
        {},
        "text",
        [
            "",
            "Suite 1236",
            "4321 Rue Somewhere",
            "Quebec",
            "QC",
            "G1V 2M2",
            "Canada"
        ]
    ],
    [
        "email",
        {},
        "text",
        "administrative.user@example.com"
    ],
    [
        "tel",
        {
            "type": "voice"
        },
        "uri",
        "tel:+1-555-555-1236;ext=789"
    ],
    [
        "tel",
        {
            "type": "fax"
        },
        "uri",
        "tel:+1-555-555-6321"
    ]
]
],
{
    "objectClassName": "entity",
    "handle": "www",

```

```

    "roles": [
      "billing"
    ],
    "vcardArray": [
      "vcard",
      [
        [
          "version",
          {},
          "text",
          "4.0"
        ],
        [
          "fn",
          {},
          "text",
          "Billing User"
        ],
        [
          "email",
          {},
          "text",
          "billing.user@example.com"
        ]
      ]
    ]
  },
  "events": [
    {
      "eventAction": "registration",
      "eventDate": "1997-06-03T00:00:00Z"
    },
    {
      "eventAction": "last changed",
      "eventDate": "2020-05-28T01:35:00Z"
    },
    {
      "eventAction": "expiration",
      "eventDate": "2021-06-03T04:00:00Z"
    }
  ],
  "status": [
    "server delete prohibited",
    "server update prohibited",
    "server transfer prohibited",
    "client transfer prohibited"
  ]
}

```

Figure 11: Unredacted RDAP Lookup Response

Example redacted version of an RDAP lookup response:

```
{
  "rdapConformance": [
    "rdap_level_0",
    "redacted"
  ],
  "objectClassName": "domain",
  "ldhName": "example.com",
  "securedDNS": {
    "delegationSigned": false
  },
  "notices": [
    {
      "title": "Terms of Use",
      "description": [
        "Service subject to Terms of Use."
      ],
      "links": [
        {
          "rel": "self",
          "href": "https://www.example.com/terms-of-use",
          "type": "text/html",
          "value": "https://www.example.com/terms-of-use"
        }
      ]
    }
  ],
  "nameservers": [
    {
      "objectClassName": "nameserver",
      "ldhName": "ns1.example.com"
    },
    {
      "objectClassName": "nameserver",
      "ldhName": "ns2.example.com"
    }
  ],
  "entities": [
    {
      "objectClassName": "entity",
      "handle": "123",
      "roles": [
        "registrar"
      ],
      "publicIds": [
        {
          "type": "IANA Registrar ID",
          "identifier": "1"
        }
      ]
    }
  ],
}
```

```
"vcardArray": [  
  "vcard",  
  [  
    [  
      "version",  
      {},  
      "text",  
      "4.0"  
    ],  
    [  
      "fn",  
      {},  
      "text",  
      "Example Registrar Inc."  
    ],  
    [  
      "adr",  
      {},  
      "text",  
      [  
        "",  
        "Suite 100",  
        "123 Example Dr.",  
        "Dulles",  
        "VA",  
        "20166-6503",  
        "US"  
      ]  
    ],  
    [  
      "email",  
      {},  
      "text",  
      "contact@organization.example"  
    ],  
    [  
      "tel",  
      {  
        "type": "voice"  
      },  
      "uri",  
      "tel:+1.7035555555"  
    ],  
    [  
      "tel",  
      {  
        "type": "fax"  
      },  
      "uri",
```

```

        "tel:+1.7035555556"
    ]
]
],
"entities": [
    {
        "objectClassName": "entity",
        "roles": [
            "abuse"
        ],
        "vcardArray": [
            "vcard",
            [
                [
                    "version",
                    {},
                    "text",
                    "4.0"
                ],
                [
                    "fn",
                    {},
                    "text",
                    "Abuse Contact"
                ],
                [
                    "email",
                    {},
                    "text",
                    "abuse@organization.example"
                ],
                [
                    "tel",
                    {
                        "type": "voice"
                    },
                    "uri",
                    "tel:+1.7035555555"
                ]
            ]
        ]
    }
]
},
{
    "objectClassName": "entity",
    "handle": "XXXX",
    "roles": [
        "registrant"
    ]
}

```

```

],
"vcardArray": [
  "vcard",
  [
    [
      "version",
      {},
      "text",
      "4.0"
    ],
    [
      "fn",
      {},
      "text",
      ""
    ],
    [
      "adr",
      {},
      "text",
      [
        "",
        "",
        "",
        "",
        "QC",
        "",
        "Canada"
      ]
    ]
  ]
]
},
{
  "objectClassName": "entity",
  "handle": "YYYY",
  "roles": [
    "technical"
  ],
  "vcardArray": [
    "vcard",
    [
      [
        "version",
        {},
        "text",
        "4.0"
      ],
      [

```



```

        "fn",
        {},
        "text",
        ""
    ],
    [
        "org",
        {},
        "text",
        "Example Inc."
    ],
    [
        "adr",
        {},
        "text",
        [
            "",
            "Suite 1234",
            "4321 Rue Somewhere",
            "Quebec",
            "QC",
            "G1V 2M2",
            "Canada"
        ]
    ]
]
]
}
],
"events": [
    {
        "eventAction": "registration",
        "eventDate": "1997-06-03T00:00:00Z"
    },
    {
        "eventAction": "last changed",
        "eventDate": "2020-05-28T01:35:00Z"
    },
    {
        "eventAction": "expiration",
        "eventDate": "2021-06-03T04:00:00Z"
    }
],
"status": [
    "server delete prohibited",
    "server update prohibited",
    "server transfer prohibited",
    "client transfer prohibited"
],

```

```

"redacted": [
  {
    "name": {
      "description": "Registry Domain ID"
    },
    "prePath": "$.handle",
    "pathLang": "jsonpath",
    "method": "removal",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Registrant Name"
    },
    "postPath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='fn')][3]",
    "pathLang": "jsonpath",
    "method": "emptyValue",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Registrant Organization"
    },
    "prePath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='org')]",
    "pathLang": "jsonpath",
    "method": "removal",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Registrant Street"
    },
    "postPath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='adr')][3][:3]",
    "pathLang": "jsonpath",
    "method": "emptyValue",
    "reason": {
      "description": "Server policy"
    }
  },
  {

```

```

    "name": {
      "description": "Registrant City"
    },
    "postPath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='adr')][3][3]",
    "pathLang": "jsonpath",
    "method": "emptyValue",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Registrant Postal Code"
    },
    "postPath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='adr')][3][5]",
    "pathLang": "jsonpath",
    "method": "emptyValue",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Registrant Email"
    },
    "prePath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[0]=='email')]",
    "method": "removal",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Registrant Phone"
    },
    "prePath": "$.entities[?(@.roles[0]=='registrant')].
      vcardArray[1][?(@[1].type=='voice')]",
    "method": "removal",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Technical Name"
    },

```

```

    "postPath": "$.entities[?(@.roles[0]=='technical')].
      vcardArray[1][?(@[0]=='fn')][3]",
    "method": "emptyValue",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Technical Email"
    },
    "prePath": "$.entities[?(@.roles[0]=='technical')].
      vcardArray[1][?(@[0]=='email')]",
    "method": "removal",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Technical Phone"
    },
    "prePath": "$.entities[?(@.roles[0]=='technical')].
      vcardArray[1][?(@[1].type=='voice')]",
    "method": "removal",
    "reason": {
      "description": "Server policy"
    }
  },
  {
    "name": {
      "description": "Technical Fax"
    },
    "prePath": "$.entities[?(@.roles[0]=='technical')].
      vcardArray[1][?(@[1].type=='fax')]",
    "reason": {
      "description": "Client request"
    }
  },
  {
    "name": {
      "description": "Administrative Contact"
    },
    "prePath": "$.entities[?(@.roles[0]=='administrative')]",
    "method": "removal",
    "reason": {
      "description": "Refer to the technical contact"
    }
  },

```

```
{
  "name": {
    "description": "Billing Contact"
  },
  "prePath": "$.entities[?(@.roles[0]=='billing')]",
  "method": "removal",
  "reason": {
    "description": "Refer to the registrant contact"
  }
}
]
```

Figure 12: Redacted RDAP Lookup Response

Example unredacted version of an RDAP search response:

```

{
  "rdapConformance": [
    "rdap_level_0"
  ],
  "domainSearchResults": [
    {
      "objectClassName": "domain",
      "handle": "ABC121",
      "ldhName": "example1.com",
      "links": [
        {
          "value": "https://example.com/rdap/domain/example1.com",
          "rel": "self",
          "href": "https://example.com/rdap/domain/example1.com",
          "type": "application/rdap+json"
        },
        {
          "value": "https://example.com/rdap/domain/example1.com",
          "rel": "related",
          "href": "https://example.com/rdap/domain/example1.com",
          "type": "application/rdap+json"
        }
      ]
    },
    {
      "objectClassName": "domain",
      "handle": "ABC122",
      "ldhName": "example2.com",
      "links": [
        {
          "value": "https://example.com/rdap/domain/example2.com",
          "rel": "self",
          "href": "https://example.com/rdap/domain/example2.com",
          "type": "application/rdap+json"
        },
        {
          "value": "https://example.com/rdap/domain/example2.com",
          "rel": "related",
          "href": "https://example.com/rdap/domain/example2.com",
          "type": "application/rdap+json"
        }
      ]
    }
  ]
}

```

Figure 13: Unredacted RDAP Search Response

Example redacted version of an RDAP search response:


```

{
  "rdapConformance": [
    "rdap_level_0",
    "redacted"
  ],
  "domainSearchResults": [
    {
      "objectClassName": "domain",
      "ldhName": "example1.com",
      "links": [
        {
          "value": "https://example.com/rdap/domain/example1.com",
          "rel": "self",
          "href": "https://example.com/rdap/domain/example1.com",
          "type": "application/rdap+json"
        },
        {
          "value": "https://example.com/rdap/domain/example1.com",
          "rel": "related",
          "href": "https://example.com/rdap/domain/example1.com",
          "type": "application/rdap+json"
        }
      ],
      "redacted": [
        {
          "name": {
            "type": "Registry Domain ID"
          },
          "prePath": "$.domainSearchResults[0].handle",
          "pathLang": "jsonpath",
          "method": "removal",
          "reason": {
            "type": "Server policy"
          }
        }
      ]
    },
    {
      "objectClassName": "domain",
      "ldhName": "example2.com",
      "links": [
        {
          "value": "https://example.com/rdap/domain/example2.com",
          "rel": "self",
          "href": "https://example.com/rdap/domain/example2.com",
          "type": "application/rdap+json"
        },
        {
          "value": "https://example.com/rdap/domain/example2.com",

```

```
    "rel": "related",
    "href": "https://example.com/rdap/domain/example2.com",
    "type": "application/rdap+json"
  }
],
"redacted": [
  {
    "name": {
      "description": "Registry Domain ID"
    },
    "prePath": "$.domainSearchResults[1].handle",
    "pathLang": "jsonpath",
    "method": "removal",
    "reason": {
      "description": "Server policy"
    }
  }
]
}
]
```

Figure 14: Redacted RDAP Search Response

5. JSONPath Considerations

[JSONPath](#) [[I-D.ietf-jsonpath-base](#)] is the default JSON path expression language. This section includes JSONPath considerations for clients and servers.

5.1. JSONPath Client Considerations

This section covers considerations for clients that receive responses from servers using [[I-D.ietf-jsonpath-base](#)] to identify redacted RDAP fields with the "prePath" or "postPath" member of redacted objects in the "redacted" member. The list of JSONPath client considerations include:

1. When the server is using the [Redaction By Removal Method](#) ([Section 3.1](#)) or the [Redaction by Replacement Value Method](#) ([Section 3.4](#)) with an alternative field value, the JSONPath expression of the "prePath" member will not resolve successfully with the redacted response. The client can key off the "name" member for display logic related to the redaction.

5.2. JSONPath Server Considerations

This section covers considerations for servers using [[I-D.ietf-jsonpath-base](#)] to identify redacted RDAP fields with the "prePath" or "postPath" member of redacted objects in the "redacted" member. The list of JSONPath considerations include:

1. Use absolute paths with the '\$' JSONPath element. An example is "\$.handle" for the "Registry Domain ID" in a lookup response or "\$.domainSearchResults[0].handle" in a search response.
2. Validate a JSONPath expression with the non-redacted RDAP response when using the "prePath" member, where evaluating the expression results in returning the redacted field.
3. Reference the removed object field when redacting an entire object by the [Redaction by Removal Method](#) ([Section 3.1](#)), where all of the object's child fields are explicitly removed. An example is "\$.entities[?(@.roles[0]=='administrative')]" for the entire "Administrative Contact".
4. It is possible for there to be multiple bases for the redaction of certain content. For example, if server policy is such that all administrative-role entities are redacted and all technical-role entities are redacted, then an entity having both the administrative role and the technical role could be redacted for two different reasons. In this situation, a server is required to include at least one "redacted" entry, but should consider including a separate "redacted" entry for each applicable basis for redaction, so as to clearly document the

server policies that are relevant to redaction in each instance.

5. Reference the removed field when using the [Redaction by Removal Method](#) ([Section 3.1](#)). An example is "\$.handle" for the "Registry Domain ID".
6. Reference index 0 of the [jCard](#) [RFC7095] property array, which is the [jCard](#) [RFC7095] "name" property, with a filter expression containing the name of the field, when redacting a [jCard](#) [RFC7095] field using the [Redaction by Removal Method](#) ([Section 3.1](#)). An example is "\$.entities[?(@.roles[0]=='registrant')].vcardArray[1][?(@[0]=='email')]" for the "Registrant Email".
7. Reference [jCard](#) [RFC7095] field value or values redacted by array index 3 and greater, when redacting a [jCard](#) [RFC7095] field using the [Redaction by Empty Value Method](#) ([Section 3.2](#)). The [jCard](#) [RFC7095] property array index 3 and greater contain the property values, where the property values set with an empty value are referenced directly in place of the [jCard](#) [RFC7095] property name. Servers can then systematically redact [jCard](#) [RFC7095] field value or values based on the JSONPath expressions and clients will directly know which [jCard](#) [RFC7095] property values have been redacted. An example is "\$.entities[?(@.roles[0]=='registrant')].vcardArray[1][?(@[0]=='fn')][3]" for the "Registrant Name" or "\$.entities[?(@.roles[0]=='registrant')].vcardArray[1][?(@[0]=='adr')][3][5]" for the "Registrant Postal Code".
8. RDAP extensions should define any special JSONPath considerations required to identify redacted RDAP fields if these considerations are insufficient.

6. IANA Considerations

6.1. RDAP Extensions Registry

IANA is requested to register the following value in the RDAP Extensions Registry:

Extension identifier: redacted

Registry operator: Any

Published specification: This document.

Contact: IESG <iesg@ietf.org>

Intended usage: This extension identifies the redacted fields in an RDAP response.

6.2. RDAP JSON Values Registry

Section 10.2 of [\[RFC9083\]](#) defines the RDAP JSON Values Registry with pre-defined Type field values and the use of the "Expert Review" policy defined in [\[RFC8126\]](#). This specification defines three new

RDAP JSON Values Registry Type field values that can be used to register pre-defined redacted name, reason, and expression language values. IANA is instructed to update the RDAP JSON Values Registry to accept these additional type field values as follows:

"redacted name": Redacted name being registered. The registered redacted name is referenced using the "type" field of the redacted "name" field.

"redacted reason": Redacted reason being registered. The registered redacted reason is referenced using the "type" field of the redacted "reason" field.

"redacted expression language": Redacted expression language being registered. The registered redacted expression language is referenced using the "pathLang" field.

The following values should be registered by the IANA in the RDAP JSON Values Registry described in [\[RFC9083\]](#):

Value: jsonpath

Type: redacted expression language

Description: JSON path expression language, as defined in draft-ietf-jsonpath-base.

Registrant Name: IETF

Registrant Contact Information: iesg@ietf.org

7. Implementation Status

Note to RFC Editor: Please remove this section and the reference to [RFC 7942](#) [\[RFC7942\]](#) before publication.

This section records the status of known implementations of the protocol defined by this specification at the time of posting of this Internet-Draft, and is based on a proposal described in [RFC 7942](#) [\[RFC7942\]](#). The description of implementations in this section is intended to assist the IETF in its decision processes in progressing drafts to RFCs. Please note that the listing of any individual implementation here does not imply endorsement by the IETF. Furthermore, no effort has been spent to verify the information presented here that was supplied by IETF contributors. This is not intended as, and must not be construed to be, a catalog of available implementations or their features. Readers are advised to note that other implementations may exist.

According to [RFC 7942](#) [[RFC7942](#)], "this will allow reviewers and working groups to assign due consideration to documents that have the benefit of running code, which may serve as evidence of valuable experimentation and feedback that have made the implemented protocols more mature. It is up to the individual working groups to use this information as they see fit".

7.1. IIT-CNR/Registro.it RDAP Server

Responsible Organization: Institute of Informatics and Telematics of National Research Council (IIT-CNR)/Registro.it

Location: <https://rdap.pubtest.nic.it/>

Description: This implementation includes support for RDAP queries using data from the public test environment of .it ccTLD. The "redacted" array can be returned in the response to the domain lookup that is the only available to anonymous users.

Level of Maturity: This is an "alpha" test implementation.

Coverage: This implementation includes all of the features described in this specification.

Contact Information: Mario Loffredo, mario.loffredo@iit.cnr.it

8. Security Considerations

The extension described in this document does not provide any security services beyond those described by [[RFC9083](#)].

9. Acknowledgements

The authors wish to thank the following persons for their feedback and suggestions: Marc Blanchet, Tom Harrison, Scott Hollenbeck, Pawel Kowalik, Mario Loffredo, Gustavo Lozano, Andy Newton, Jasdip Singh, and Rick Wilhelm.

10. References

10.1. Informative References

[**I-D.ietf-regext-rdap-jscontact**] Loffredo, M. and G. Brown, "Using JSContact in Registration Data Access Protocol (RDAP) JSON Responses", Work in Progress, Internet-Draft, draft-ietf-regext-rdap-jscontact-16, 6 June 2023, <<https://>

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- [RFC8605] Hollenbeck, S. and R. Carney, "vCard Format Extensions: ICANN Extensions for the Registration Data Access Protocol (RDAP)", RFC 8605, DOI 10.17487/RFC8605, May 2019, <<https://www.rfc-editor.org/info/rfc8605>>.

10.2. Normative References

- [I-D.ietf-jsonpath-base] Gössner, S., Normington, G., and C. Bormann, "JSONPath: Query expressions for JSON", Work in Progress, Internet-Draft, draft-ietf-jsonpath-base-21, 24 September 2023, <<https://datatracker.ietf.org/doc/html/draft-ietf-jsonpath-base-21>>.
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10.17487/RFC9082, June 2021, <<https://www.rfc-editor.org/info/rfc9082>>.

[RFC9083] Hollenbeck, S. and A. Newton, "JSON Responses for the Registration Data Access Protocol (RDAP)", STD 95, RFC 9083, DOI 10.17487/RFC9083, June 2021, <<https://www.rfc-editor.org/info/rfc9083>>.

Appendix A. Change History

A.1. Change from 00 to 01

1. Changed rdapConformance to use pointed "redacted_0.1" value to support structural changes of the extension up to the target of "redacted_1.0".
2. Updates based on the Gustavo Lozano feedback:
 1. Updated the language to change the special treatment of jCard to be more generic for future RDAP extensions that leverage fixed length JSON arrays.
 2. Added "RDAP extensions should define any special JSONPath considerations required to identify redacted RDAP fields if the these considerations are insufficient." to the JSONPath Considerations section to generalize it.
3. Updates based on the Marc Blanchet feedback:
 1. Added a reference to draft-ietf-regext-rdap-jscontact as an example of an RDAP extension that is suited for the Redaction by Removal Method based on the lack of dependency on positional JSON arrays.
 2. Added support for registered and unregistered (free-form) redaction reasons by changing the "reason" property to be a JSON object with the "type" and "description" properties. The "type" property includes registration in the IANA JSON Values Registry.
 3. Added a "JSON Values Registry" section in the IANA Considerations section to define the "redaction reason" JSON Values Registry Type values to support the registration of redaction reasons.
4. Updates based on the Mario Loffredo feedback:
 1. Added support for registered and unregistered (free-form) redaction names by changing the "reason" property to be a JSON object with the "type" and "description" properties. The "type" property includes registration in the IANA JSON Values Registry.
 2. Added a "JSON Values Registry" section in the IANA Considerations section to define the "redaction name"

JSON Values Registry Type values to support the registration of redaction names.

3. Added a JSONPath Considerations item associated with handling entities with multiple roles.
4. Added language to restrict the extension to responses.

A.2. Change from 01 to 02

1. Updates to add support for RDAP search responses:
 1. Replaced "RDAP lookup response" with "RDAP response" throughout the draft to expand the scope to include search.
 2. Updated the description in the second paragraph of the Introduction to cover both a lookup response and a search response.
 3. Added an example of the use of an absolute path for a search response to the "JSONPath Considerations" section.
 4. Added a description of the placement of the "redacted" member in a lookup response and a search response in the ""redacted" Member" section.
 5. Added an example of an unredacted search response and a redacted search response in the ""redacted" Member" section.

A.3. Change from 02 to 03

1. Fixed mismatch of the extension identifier, which was updated to "redacted_0.1" throughout the draft based on feedback from Mario Loffredo.
2. Added the JSONPath Considerations item associated with redacting fields for multiple entities with the same role based on implementation feedback from Mario Loffredo.
3. Added the Implementation Status section that includes the server implementation by Mario Loffredo.
4. Added use of numbered figures for easy reference for JSON Values Registry registrations.
5. Updated the example unredacted and redacted lookup responses to include the "objectClassName" and "handle" members.
6. Changed RFC7482 and RFC7483 references to RFC9082 and RFC9083, respectively.

A.4. Change from 03 to 04

1. Changed the extension identifier to be "redacted" instead of a versioned value, which will be leveraged for both the rdapConformance value and the JSON Values.
2. Changed the RDAP Conformance to be "redacted_level_0.2", which leveraged the extension identifier as a prefix along with

"_level_" and a pointed version number. The version number will become "1.0" once the draft passes WGLC.

3. Added the Redaction by Replacement Value Method.

A.5. Change from 04 to 05

1. Update the RDAP Extensions Registry entries to include the identifier that is used for the RDAP conformance value and to include the "redacted" prefix identifier to use for the JSON response member.
2. Changed the RDAP Conformance to be "redacted_level_0_3", which is registered in the RDAP Extensions Registry. The RDAP Conformance value will become "redacted_level_1" once the draft passes WGLC.

A.6. Change from 05 to 06

1. Fixed a couple nits.
2. Updated the Redaction by Replacement Value Method email web form examples to use the "contact-uri" jCard property of RFC 8605.

A.7. Change from 06 to 07

1. Added the optional replacementPath child member for use with the Redaction by Replacement Value Method.

A.8. Change from 07 to 08

1. Updates based on the Rick Wilhelm feedback:
 1. Updated the definition of a redacted RDAP field in the Introduction section.
 2. Updated the reference to three methods instead of two in the Redaction Methods section.
 3. Created a new paragraph for the example in the Redaction by Removal Method section.
 4. Explicitly specified one or more redacted fields for inclusion of the "redacted" member in the "redacted" Member section.
 5. Updated the description of the "method" member in the "redacted" Member section.

A.9. Change from 08 to 09

1. Updated the RDAP extensions Registry registration and RDAP conformance to match the working group consensus that does not include a version with "redacted".

A.10. Change from 09 to 10

1. Updates based on the Pawel Kowalik feedback:

1. Changed "placeholder text value will not match the format requirements" to "placeholder text value may not match the format requirements" in Section 3.
2. Changed the "path" member OPTIONAL and added "The "path" member MUST be set when the redacted field does exist in the redacted response" to cover when it's required.
3. Added the definition of the "redacted expression language" JSON Values Registry Type in the IANA Considerations and pre-registered the "jsonpath" "redacted expression language" value.
4. In the definition of the "path" member, added clarification whether the "path" member expression refers to the pre-redacted response field or the redacted response field based on the redaction method.
5. Replaced "The Redaction by Removal Method MUST NOT be used to remove a field using the position in a fixed length array to signal the redacted field" with "The Redaction by Removal Method MUST NOT be used to remove an element of an array where the position of the element in the array determines semantic meaning" in Section 3.1.
6. Added the "JSONPath Client Considerations" and "JSONPath Server Considerations" subsections to the "JSONPath Considerations" section.

2. Updates based on the Mario Loffredo feedback:

1. Revised Figure 7 to reference the "email" property and the "contract-uri" property instead of the value elements of the properties.
2. Rephrased the sentence in section 4.2 to 'The "redacted" member contains an array of objects with the following child members'.
3. Added the Redaction by Partial Value Method for redaction of a portion of a formatted property, such as the jCard "fn" and "label" properties.

A.11. Change from 10 to 11

1. Updated Abstract and first sentence of Introduction to "This document describes an RDAP extension for specifying methods of redaction of RDAP responses and explicitly identifying redacted RDAP response fields, using JSONPath as the default expression language.", based on feedback by Pawel Kowalik.
2. Changed "path" member to a "prePath" and "postPath" member to indicate whether the path expression applies to the pre-

redacted or post-redacted response, based on feedback by Pawel Kowalik.

A.12. Change from 11 to 12

1. Updates based on the Andy Newton feedback:

1. Added section "The resulting redacted RDAP response MUST comply with the RDAP RFCs, such as [RFC9083]" as second sentence of Section 3.

2. Updates based on the Tom Harrison feedback:

1. Added clarification in Section 2 "Conventions Used in This Document" that the JSONPath expressions in the examples are for illustration purposes with single-role entities and the exact expressions to use by the server are out-of-scope.
2. Replaced consideration #4 "When an entity has multiple roles..." in Section 5.2 "JSONPath Server Considerations" with the recommended language starting with "It is possible for there to be multiple bases for redaction..."
3. Revised the sentence "The client can first key off the "name" member for display logic and utilize a template RDAP response overlaid with the redacted response to successfully resolve the JSONPath expression." in Section 5.1 "JSONPath Client Considers" to "The client can key off the "name" member for display logic related to the redaction.".
4. Replaced "type" with "description" for the example redaction "name" and "reason" members, so not to infer that they are being registered for use.
5. Changed "Two new JSON Values Registry Type field values are used to register pre-defined redacted name and reason values" in Section 6.2 "JSON Values Registry" to "Three new JSON Values Registry Type field values are used to register pre-defined redacted name, reason, and expression language values".

3. Updates based on validating each of the draft examples:

1. Added missing comma between the "Administrative Contact" and "Billing Contact" "redacted" members.
2. Removed consideration #5 in Section 5.2 "JSONPath Server Considerations" since the use of the JSONPath expression "\$.entities[?(@.roles[0]=='technical')][0]" is not valid and the exact JSONPath expression to use is out-of-scope.

A.13. Change from 12 to 13

1. Updates based on the Jasdeep Singh feedback:
 1. In Section 1, replaced the sentence "The redacted JSON fields will either be removed or have empty values in the RDAP response" with "The redacted JSON fields will either be removed, have empty values, have partial values, or be replaced in the RDAP response."
 2. In Section 3, changed the reference of three categories to four categories.
 3. In Section 3.1, changed ", which is the preferred method" to ", which is the default method" to clarify the Removal Method as the default redaction method.
 4. In Section 4.2, updated the sentence to read "The "redacted" member is included as a member of the object instance in a lookup response, for the object classes defined in [RFC9083], and as a member of the array of object instances in a search response."
 5. In Section 4.2, explicitly defined the "name" member as REQUIRED".

A.14. Change from 13 to 14

1. Replaced RFC 7483 reference with RFC 9083 based on the Document Shepherd review by Andy Newton.
2. Replaced the "Registrant Name" "IESG" value with "IETF" for the "RDAP JSON Values Registry" registrations.
3. Updates based on the Murray Kucherawy AD evaluation feedback:
 1. Combined sentences on the use of placeholder text in Section 3 "Redaction Methods" for clarification.
 2. Changed the two SHOULDs to MUSTs in Section 3.2 "Redaction by Empty Value Method".
 3. Changed "alternate" to "alternative" in Section 3.4 "Redaction by Replacement Value Method".
 4. Changed "JSON expression" to "JSON path expression" in Section 4.2 "
 5. Changed references of "JSON Values Registry" to "RDAP JSON Values Registry" to match the IANA registry name.

A.15. Change from 14 to 15

1. Based on feedback from Paul Wouters, moved the Security Considerations language to Section 4.2 ""redacted" Member", since exclusion of a "redacted" child member due to privacy is a feature. The Security Considerations section was made generic.

2. Revised the RDAP JSON Values Registry IANA Considerations used to register pre-register the pre-defined redacted name, redacted reason, and redacted expression language values based on Scott Hollenbeck's expert review feedback.

A.16. Change from 15 to 16

1. Updates based on feedback from Roman Danyliw:
 1. Updated "Redaction in RDAP can be handled in multiple ways. The resulting redacted RDAP response MUST comply with the RDAP RFCs, such as [RFC9083]" to "Redaction in RDAP can be handled in multiple ways. The resulting redacted RDAP response MUST comply with the format defined in the RDAP RFCs with the RDAP RFCs, such as [RFC9083] and updates"
 2. Add "The server MAY choose to publish a redaction policy describing how this extension is implemented for their constituency. The contents of such a policy are outside the scope of this specification." to Section 4.2
""redacted" Member".

Authors' Addresses

James Gould
VeriSign, Inc.
12061 Bluemont Way
Reston, VA 20190
United States of America

Email: jgould@verisign.com
URI: <http://www.verisigninc.com>

David Smith
VeriSign, Inc.
12061 Bluemont Way
Reston, VA 20190
United States of America

Email: dsmith@verisign.com
URI: <http://www.verisigninc.com>

Jody Kolker
GoDaddy Inc.
14455 N. Hayden Rd. #219
Scottsdale, AZ 85260
United States of America

Email: jkolker@godaddy.com
URI: <http://www.godaddy.com>

Roger Carney
GoDaddy Inc.
14455 N. Hayden Rd. #219
Scottsdale, AZ 85260
United States of America

Email: rcarney@godaddy.com
URI: <http://www.godaddy.com>